energy beam; (2) a shutter that includes (i) a frame defining an aperture toward which the energy beam is directed and (ii) a plurality of blades that are **fixedly** secured to the frame; and (3) device that rotates the shutter to cause the plurality of blades to intercept or allow the energy beam to travel through the aperture. Each blade can have a substantially planar surface and the plurality of blades are **fixedly** secured to the frame such that the planar surfaces of the plurality of blades are substantially parallel to each other. The shutter device is particularly suited for operation in a vacuum environment and can achieve shuttering speeds from about 0.1 second to 0.001 second or faster.

What is claimed:

1. (Thrice Amended) An exposure device comprising:

   a source of radiation that generates an energy beam;

   a shutter that includes (i) a frame defining an aperture toward which the energy beam is directed and (ii) a plurality of blades that are **fixedly** secured to the frame **[wherein each blade does not move relative to the other blades]**; and

   means for rotating the frame of the shutter to cause the plurality of said **fixedly secured blades** to intercept or allow the energy beam to travel through the aperture. **[wherein the positions of the individual blades remain fixed relative to each other.]**

2. (Currently amended) The exposure device of claim -1 wherein each blade has a substantially planar surface and the plurality of blades are **fixedly** secured to the frame such that the planar surfaces of the plurality of blades are substantially parallel to each other.

3. (Amended) The exposure device of claim 1 wherein the means for rotating the frame of the shutter comprise a solenoid that is encased in a vacuum compatible housing that entraps contaminants from the solenoid.

4. The exposure device of claim 1 wherein each blade has a width that ranges from about 0.5 cm to 10 cm.

5. (Amended) The exposure device of claim 1 wherein the light beam is a substantially collimated beam that has a cross sectional area of from about 5 cm^2 to 30,000 cm^2.

6. The exposure device of claim 1 wherein each blade is made from a metal that is selected from the group consisting of aluminum, steel, nickel, and titanium.

7. The exposure device of claim 1 wherein each blade is made from a plastic that is selected from the group consisting of vinyl, polytetrafluoroethylene, polyimide, polyester, polyamide, and polypropylene.

8. The exposure device of claim 1 wherein the source of radiation generates radiation having a wavelength of from about 0.1 nm to 1 mm.

9. The exposure device of claim 1 wherein the aperture has an area of between about 5 cm^2 to 30,000 cm^2.

10. (Twice amended) The exposure device of claim 1 wherein the means for rotating the frame of the shutter comprises:

pivot means for pivoting the frame such that the plurality of **fixedly secured** blades rotates about an axis that is normal to the substantially planar surfaces of the plurality of **said** blades; and

drive means for moving the frame in a controlled manner, (i) from an open position that allows the energy beam to travel through the aperture to a closed position that intercepts the energy beam and (ii) from the closed position to the open position.

11. The exposure device of claim 10 wherein in the open position the substantially planar surface of each blade of the plurality of blades is parallel to the path of the energy beam when the frame is in the open position.

12. The exposure device of claim 10 wherein the drive means comprises means for moving the frame from the open position to the closed position or from the closed position to the open position within a time period that ranges from about 0.001 second to 0.1 second.

13. The exposure device of claim 10 wherein at least 90% of the intensity of the energy beam passes through the aperture when the frame is in the open position.

14. (Thrice Amended) A method of patterning a substrate through controlled exposure of the substrate in a vacuum system which comprises the steps of:

generating radiation comprising an energy beam;

controlling the exposure with an exposure device that comprises a shutter that includes (i) a frame defining an aperture toward which the energy beam is directed and (ii) a plurality of blades that are **fixedly** secured to the frame. **[wherein each blade does not move relative to the other blades]**; and

rotating the frame of the shutter to cause the plurality of **fixedly secured** blades to intercept or allow the energy beam to travel through the aperture. **[wherein the positions of the individual blades remain fixed relative to each other.]**

15. (Currently amended) The method of claim 14 wherein each blade has a substantially planar surface and the plurality of blades are **fixedly** secured to the framesuch that the planar surfaces of the plurality of blades are substantially parallel to each other.

16. (Amended) The method of claim 14 wherein the exposure device includes means for rotating the frame of the shutter that includes a solenoid that is encased in a vacuum compatible housing that entraps contaminants from the solenoid.

17. The method of claim 14 wherein each blade has a width that ranges from about 0.5 cm to 10 cm.

18. The method of claim 14 wherein the energy beam is a substantially collimated beam that has a cross sectional area of from about 5 cm2 to 30,000 cm^2.

19. The method of claim 14 wherein each blade is made from a metal that is selected from the group consisting of aluminum, steel, nickel and titanium.

20. The method of claim 14 wherein each blade is made from a plastic that is selected from the group consisting of vinyl polytetrafluoroethylene, polyamide, polyester, polyamide and polypropylene.

21 The method of claim 14 wherein the source of radiation generates radiation having a wavelength of from about 0.1 nm to I mm.

22. The method of claim 14 wherein the aperture has an area of between about 5 cm^2 to 30,000 cm^2.

23.(Twice amended) The method of claim 14 wherein the exposure device includes means for rotating the frame of the shutter that comprises:

pivot means for pivoting the frame such that the plurality of **fixedly secured** blades rotates about an axis that is normal to the substantially planar surfaces of the plurality of **said** blades; and

drive means to move the frame in a controlled manner (i) from an open position that allows the energy beam to travel through the aperture and a closed position that intercepts the energy beam and (ii) from the closed position to the open position.

24. The method of claim 23 wherein the substantially planar surface of each blade of the plurality of blades is parallel to the path of the energy beam when the frame is in the open position.

25. The: method of claim 23 wherein the drive means comprises means for moving the frame from the open position to the closed position or from the closed position to, the open position in less than from about 0.001 second to 0.1 second.

26. The method of claim 23 wherein at least 90% of the intensity of the energy beam passes through the aperture when the frame is in the closed position.